

R E M A R K S

Claims 1 to 14 as set forth in Appendix II of this paper are now pending in this case. Claim 6 has been amended, and Claims 9 to 14 have been added as indicated in the Listing of Claims set forth in Appendix I of this paper.

Accordingly, Claim 6 has been revised to recite the process steps previously incorporated by reference to Claim 1. New Claims 9 to 14 have been added to further bring out some of the subsidiary embodiments of applicants' catalyst. The respective embodiments are supported by the disclosure as follows:

Claim 9: page 8, indicated lines 30 to 33, of the application;

Claim 10: page 9, indicated lines 4 to 14, of the application;

Claim 11: page 9, indicated lines 35 to 38, of the application;

Claim 12: page 10, indicated lines 8 to 14, of the application;

Claims 13 and 14: page 10, indicated lines 19 to 23, of the application.

No new matter has been added.

The Examiner has rejected Claim 8 under 35 U.S.C. §112, ¶2, as being indefinite. More particularly, the Examiner takes the position that Claim 8 fails to recite process steps.

It is respectfully submitted that Claim 8 depends upon Claim 6 and incorporates the process steps recited therein by reference. Accordingly, it is respectfully requested that the rejection of Claim 8 under Section 112, ¶2, be withdrawn. Favorable action is solicited.

The Examiner has provisionally rejected Claims 1 to 8 under the judicially created doctrine of obviousness-type double patenting as being unpatentable in light of Claims 1 to 7 and 9 of co-pending application *Serial No. 10/090,763*.

It is respectfully noted that the present application and co-pending application *Serial No. 10/090,763* are not commonly owned. The present case is assigned to BASF Aktiengesellschaft and to XCELLSIS GmbH, whereas BASF Aktiengesellschaft is the sole assignee in the co-pending application.

It is further respectfully submitted that the invention disclosed and claimed in the present case is not rendered obvious by the claims

and/or the disclosure in co-pending application **Serial No. 10/090,763¹⁾**.

The invention disclosed and claimed by applicants relates to a catalyst which is obtained by

- (1) precipitating or spray-drying a mixture of catalyst precursor components dissolved or suspended in a diluent in order to form a solid catalyst precursor in the form of powder or granules,
- (2) calcining and reducing the solid catalyst precursor obtained in stage (1),
- (3) passivating the reduced catalyst precursor obtained in stage (2) and
- (4) shaping the passivated catalyst precursor obtained in stage (3) to form the catalyst.

Accordingly, a precursor powder or granulate is calcined and reduced and subsequently passivated. Only after the precursor powder or granulate has been pre-treated in the requisite manner (stages (1) to (3)) the catalyst is formed. More particularly, applicants have found that the catalyst exhibits particular properties when the precursor powder or granulate is reduced and passivated before the catalyst is shaped. As illustrated by the data set forth in the tables on pages 15 and 16 of the application, a catalyst which is prepared in accordance with applicants' invention exhibits a distinctly improved hardness and a distinctly reduced volume shrinkage upon use.

Claim 1 of co-pending application **Serial No. 10/090,763** relates to a catalyst which is obtained by

- i) precipitating a mixture of catalyst precursor components dissolved or suspended in a diluent with anion-containing precipitating agents, washing and drying to form a solid catalyst precursor in the form of powder or granules,
- ii) calcining the solid catalyst precursor obtained in stage (i) to an anion content from the precipitating agent of from 0.1 to 2.5% by weight and
- iii) shaping and, if required, reducing and passivating the calcined

1) The determination of obviousness-type double patenting essentially involves a determination of unobviousness under 35 U.S.C. §103, with the exception that the patent disclosure is not applicable as "prior art" (ie. In re Braat, 937 F.2d 589, 594, 19 USPQ2d 1289, 1293 (CAFC 1991); In re Vogel, 422 F.2d 438, 441-42, 164 USPQ 619, 622 (CCPA 1970)).

catalyst precursor from stage (ii) in any desired order to form the catalyst.

As explained in the first paragraph on page 7 of co-pending application **Serial No. 10/090,763**,

a relationship has now been found between volume shrinkage and hardness of the catalyst after removal on the one hand and the residual anion content, in particular residual carbonate content, on the other hand, which permits the controlled optimization of the parameters and hence of the catalyst.

The invention which is disclosed and claimed in co-pending application **Serial No. 10/090,763**, therefore, relates to a catalyst wherein the hardness is adapted by means of controlling the anion content of the catalyst. With regard to the provision in stage (iii) that "shaping and, if required, reducing and passivating the calcined catalyst precursor from stage (ii)" may be conducted "in any desired order", co-pending application **Serial No. 10/090,763** provides in the second paragraph on page 7

the calcined catalyst precursor from stage (ii) can first additionally be reduced, then passivated and then subjected to the shaping process. It is also possible for the calcined catalyst precursor from stage (ii) first to be subjected to the shaping process and then to be reduced, the catalyst obtained often no longer being pyrophoric and it therefore being possible to dispense with passivation.

According to the teaching of co-pending application **Serial No. 10/090,763** it is therefore not critical at which stage of the catalyst preparation a reduction and subsequent passivation is conducted, and a person of ordinary skill would expect that the point in the preparation of the catalyst at which the reduction and passivation is conducted is of no consequence with regard to the catalyst properties. Applicants' invention is, therefore, not rendered prima facie obvious by the claims and/or the disclosure in co-pending application **Serial No. 10/090,763**. Favorable reconsideration of the Examiner's position and withdrawal of the provisional obviousness-type double patenting rejection is therefore respectfully solicited.

The Examiner has rejected Claims 1 to 4, 6 and 8 under 35 U.S.C. §102(b) as being anticipated by the teaching of *Williams* (US 5,928,985)

which relates to a particular process of passivating copper catalysts.

It is respectfully urged that the teaching of *Williams* does not amount to an anticipating disclosure within the meaning of Section 102. The test for anticipation is one of identity, the identical invention must be shown in as complete detail as is contained in the claim²). In fact, the Federal Circuit has stated that it is error to treat claims as a catalog of separate parts, in disregard of the part-to-part relationships set forth in the claims that give those claims their meaning³).

As summarized by the Examiner, *Williams* teaches that the reduced catalyst to with the particular passivation process is to be applied can be obtained by

- (1) precipitating a mixture of catalyst precursor components;
- (2) calcining the precipitated precursor components; and
- (3) shaping into pellets, and then reducing the catalyst pellets.

It is immediately apparent that the recited procedure fails to provide for applicants' critical measure that reduction and passivation are conducted before the precursor powder or granulate is shaped.

In an alternative procedure *Williams* provides that the reduced catalyst can also be obtained by reducing the precursor components and then shaping the reduced components into granules or pellets. This alternative however equally fails to identically describe applicants' invention because according to this alternative the passivation does not take place until after the catalyst is shaped. The Examiner will note that *Williams*, throughout the disclosure and without exception, refers to a passivation of a preformed catalyst.

It is therefore respectfully requested that the rejection of Claims 1 to 4, 6 and 8 under Section 102(b) based on the teaching of *Williams* be withdrawn. Favorable action is solicited.

It is further respectfully noted that the teaching of *Williams* is equally unsuited to render applicants' invention obvious within the meaning of Section 103(a). It is well settled that the mere fact that the prior art may be modified in some manner so as to result in the invention as claimed does not make such a modification obvious unless

2) ie. Richardson v. Suzuki Motor Co., 868 F.2d 1226, 9 USPQ2d 1913 (CAFC 1989)

3) ie. Lindemann Maschinenfabrik v. American Hoist & Derrick Co., 730 F.2d 1452, 221 USPQ 481 (CAFC 1984)

the prior art suggests the desirability of such a modification⁴⁾. The teaching of *Williams* does not suggest that it is desirable to reduce and passivate the catalyst precursor components before the catalyst is shaped. It is equally well established that a composition and its properties are inseparable⁵⁾, and that the inventive subject matter as a whole, which is referred to in the statute, embraces not only the features which are particularly recited in the claims, but also the properties which are inherent in the particular combination of features defined in the claims⁶⁾. The teaching of *Williams* does not suggest that a catalyst which is obtained by first reducing and passivating the precursor components and subsequently shaping the catalyst would exhibit a distinctly improved hardness and a distinctly reduced volume shrinkage upon use. As such, the teaching of *Williams* does not render applicants' invention as a whole obvious as required by the statute.

The Examiner has rejected Claims 5 and 7 under 35 U.S.C. §103(a) as being unpatentable in light of the teaching of *Williams* when taken in view of the disclosure of *Krumberger et al.* (US 6,051,163). Claims 5 and 7 depend upon Claim 1 and incorporate the critical measures taken in accordance with applicants' invention in the preparation of the catalyst by reference.

The disclosure of *Krumberger et al.* relates to an improved catalyst which is characterized by particular Zn:Al and Cu:Zn ratios. With regard to a reduction of the catalyst it is merely stated⁷⁾ :

Before the catalyst is used in a methanol reformation reactor, or during the use therein, the copper oxide is at least partially converted into metallic copper in the catalyst. This can be achieved, for example, by reduction with hydrogen or a methanol/steam mixture.

The respective statement is not suited to motivate a person of ordinary skill in the art to modify the teaching of *Williams* in such a manner that the reduction and the passivation of the precursor components is performed before the catalyst is shaped. Correspondingly,

4) ie. *In re Fritch*, 972 F.2d 1260, 23 USPQ2d 1780, 1783-84 (CAFC 1992); *In re Gordon*, 733 F.2d 900, 902, 221 USPQ 1125, 1127 (CAFC 1984)

5) ie. *In re Papesch*, 315 F.2d 281, 137 USPQ 43 (CCPA 1963)

6) ie. *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977); *In re Wright*, 848 F.2d 1216, 6 USPQ2d 1959 (Fed. Cir. 1988), overruled on other grounds in *In re Dillon*, 919 F.2d 688, 16 USPQ2d 1897 (Fed. Cir. 1990) (en banc), cert. denied 500 U.S. 904 (1991)

7) Note col. 4, indicated lines 38 to 42, of US 6,051,163.

the respective statement of *Krumberger et al.* is not suited to convey to a person of ordinary skill that a catalyst which is obtained by first reducing and passivating the precursor components and subsequently shaping the catalyst would exhibit a distinctly improved hardness and a distinctly reduced volume shrinkage upon use. Accordingly, the teaching of *Krumberger et al.* does not close, or even narrow, the gap between the essential features of applicants' invention which are incorporated in Claims 5 and 7 by reference to Claim 1, and the disclosure of *Williams*⁸).

It is therefore respectfully requested that the rejection of Claims 5 and 7 under Section 103(a) based on the teaching of *Williams* when taken in view of the disclosure of *Krumberger et al.* be withdrawn. Favorable action is solicited.

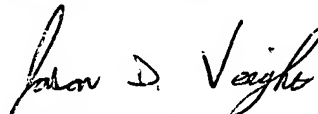
REQUEST FOR EXTENSION OF TIME:

It is respectfully requested that a one month extension of time be granted in this case. A check for the \$110.00 fee is attached.

Please charge any shortage in fees due in connection with the filing of this paper, including Extension of Time fees, to Deposit Account No. 11.0345. Please credit any excess fees to such deposit account.

Respectfully submitted,

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Encl.: THE LISTING OF CLAIMS (Appendix I)
THE CURRENT CLAIMS (Appendix II)

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8) If an independent claim is non-obvious under 35 U.S.C. §103, then any claim depending therefrom is non-obvious (In re Fine, 837 F.2d 1071, 5 USPQ2d 1596 (CAFC 1988)).

A P P E N D I X I:

THE LISTING OF CLAIMS (version with markings):

1. (original) A methanol reforming catalyst containing passivated copper and zinc oxide and/or alumina, which can be prepared by
 - (1) precipitating or spray-drying a mixture of catalyst precursor components dissolved or suspended in a diluent in order to form a solid catalyst precursor in the form of powder or granules,
 - (2) calcining and reducing the solid catalyst precursor obtained in stage (1),
 - (3) passivating the reduced catalyst precursor obtained in stage (2) and
 - (4) shaping the passivated catalyst precursor obtained in stage (3) to form the catalyst.
2. (original) A catalyst as claimed in claim 1, wherein the shaping in stage (4) leads to layers, extrudates, monoliths, strands, pellets, tablets or chips.
3. (original) A catalyst as claimed in claim 1, wherein the calcination and reduction are carried out in succession in stage (2), it being possible for the calcined catalyst precursor to be comminuted in between.
4. (original) A catalyst as claimed in claim 1, wherein the catalyst contains alumina in addition to passivated copper and zinc oxide, and solutions of zinc, aluminum and copper salts are precipitated simultaneously or in any desired sequence in stage (1).
5. (original) A catalyst as claimed in claim 4, wherein stages (1) and (2) are carried out as follows:
 - (a) precipitation of a solution of zinc and aluminum salts, the Zn:Al atomic ratio being from 3:1 to 1:3, with an alkali metal carbonate or hydroxide solution at a pH of from 5 to 12 and a temperature of from 20 to 100°C,
 - (b) isolation and washing of the precipitate to remove alkali metal ions,
 - (c) drying of the precipitate,
 - (d) calcination of the precipitate at from 250 to 800°C to give a mixed oxide,

- (e) dispersing of the mixed oxide in an acidic solution of copper and zinc salts, the Cu:Zn atomic ratio in the solution being from 1:5 to 20:1,
 - (f) precipitation of the dispersion with an alkali metal carbonate or hydroxide solution at a pH of from 6 to 9 and a temperature of from 20 to 100°C,
 - (g) performance of steps (b) to (d),
 - (h) reduction of the catalyst precursor obtained in stage (g) with a gas containing free hydrogen,
- it being possible for the solutions in steps (a) and/or (e) additionally to contain salts or oxides of one or more elements of the platinum metals, of groups 4, 5 and 11 and of the lanthanides of the Periodic Table of the Elements or for the salts or oxides to be applied to the mixed oxides.
6. (*currently amended*) A process for the preparation of [a] the catalyst [~~as claimed~~] defined in claim 1, [~~wherein said stages are carried out,~~] which comprises
- (1) precipitating or spray-drying a mixture of catalyst precursor components dissolved or suspended in a diluent in order to form a solid catalyst precursor in the form of powder or granules,
 - (2) calcining and reducing the solid catalyst precursor obtained in stage (1),
 - (3) passivating the reduced catalyst precursor obtained in stage (2) and
 - (4) shaping the passivated catalyst precursor obtained in stage (3) to form the catalyst.
7. (*original*) A process for steam-reforming methanol by reacting methanol and water over a catalyst, as defined in claim 1, at from 0.5 to 10 bar and from 150 to 450°C.
8. (*original*) A process for reducing the volume shrinkage and for increasing the mechanical hardness during operation of methanol reforming catalysts, wherein the methanol reforming catalyst is prepared by a process as claimed in claim 6.
9. (*new*) A catalyst as claimed in claim 1, wherein stage (2) comprises first calcining the solid catalyst precursor at a temperature of more than 300°C, and then subjecting the calcined solid catalyst

precursor to a reduction or a calcination under reducing conditions at a temperature of less than 300°C.

10. (new) A catalyst as claimed in claim 1, wherein stage (2) comprises reducing the solid catalyst precursor with hydrogen by means of
 - an isothermal procedure at a constant hydrogen concentration;
 - an isothermal procedure with continuously increasing hydrogen concentrations;
 - a procedure employing a constant hydrogen concentration and a continuous increase in temperature from room temperature to 500°C; or
 - a procedure employing continuously increasing hydrogen concentrations and a continuous increase in temperature from room temperature to 500°C.
11. (new) A catalyst as claimed in claim 1, wherein stage (3) comprises passivating the reduced catalyst precursor obtained in stage (2) exclusively with dilute air at room temperature to obtain copper clusters which are only externally passivated.
12. (new) A catalyst as claimed in claim 11, wherein the reduced catalyst precursor is passivated in an assembly comprising two coupled rotating tubes and an inert lock ensuring a separation of atmospheres, and air is passed countercurrently to the reduced catalyst precursor into the rotating tube.
13. (new) A catalyst as claimed in claim 1, wherein stage (2) comprises calcining and reducing the solid catalyst precursor simultaneously.
14. (new) A catalyst as claimed in claim 1, wherein stage (2) comprises calcining and reducing the solid catalyst precursor in succession.